

IN THE SPECIFICATION

Please amend the specification as follows.

[0012] Also to attain the foregoing and other aspects, the present invention proposes a process for fabricating a chip with bumps comprising the following steps. First providing a chip that has an active surface and at least a bonding pad, wherein the bonding pad exposes the active surface. Then performing an activation step, depositing a medium layer on the bonding pad. Forming at least a bump body on the medium layer in an ~~electricless~~electroless plating way, and forming a bump body passivation layer covering the bump body except for a portion of the bump body that connects to the medium layer.

[0013] According to a preferred embodiment of the present invention, the material of the bump body is nickel, and the material of the bump body passivation layer is gold. The height of the bump body is about 5 to 10 microns, and the height of the bump body passivation layer is about 1 to 3 microns. The bump body and the bump body passivation layer are formed by ~~electricless~~electroless plating.

[0018] A bumping process which includes steps of producing a bump body and a bump body passivation layer follows. In the step of producing a bump body, at least a bump body 220 is formed by ~~electricless~~electroless plating to be electrically connected to the bonding pad 216. It is accomplished by following steps. First, an activation step is performed. During the activation step, the chip 210 is dipped into a zinc ions containing solution, then zinc is deposited on the bonding pad 216 of the chip 210 to form a medium layer 228, wherein a material of the medium layer includes zinc. Since zinc is utilized to be an activator before the following ~~electricless~~electroless plating, the deposition

thickness of zinc doesn't need to be thick. Then an ~~electricless~~electroless plating step is performed. The chip 210 is dipped into a nickel ions containing solution, then nickel is formed on the medium layer 228 on the chip 210 in an ~~electricless~~electroless plating way. Nickel is deposited on zinc so that a bump body 220 is formed. The size of the bump body 220 can be controlled by the dipping time in nickel ions containing solution. Therefore, the bump body 220 is connected to the bonding pad 216 through the medium layer 228, wherein a material of the bump body 220 includes nickel.

[0022] Fig. 8 through Fig. 10 are schematic cross-sectional views showing the progression of steps for producing a bump in accordance with another preferred embodiment of the present invention. In the previous embodiment, the bump body is formed on a chip in an ~~electricless~~electroless plating way. Furthermore, a photolithography process can also be added to control the shape of the bump.

[0024] First a photo resist layer 350 is formed on the chip 310. After the photo resist layer 350 has been exposed and developed, a pattern (not shown) is transferred to the photo resist layer 350 so that at least an opening 352 (only one opening is shown), which exposes bonding pad 316, is formed in the photo resist layer 350. An activation step is followed to form a medium layer 328, zinc, on the bonding pad 316 of the chip 310. Then a bump body 320, nickel, is formed on the medium layer 328 inside the opening by ~~electricless~~electroless plating.

IN THE CLAIMS

Please amend the claims as follows.

15. (Currently Amended) A process for fabricating a bump, wherein the bump is disposed on a chip that has an active surface and at least a bonding pad, and the bonding pad exposes the active surface, the process comprising:

performing an activation step, depositing a medium layer on the bonding pad; and
performing an electroless plating process for forming at least a bump body on the
medium layer ~~in an electroless plating way.~~

16. (Original) The process of claim 15, wherein a material of the bump body is nickel.

17. (Original) The process of claim 15, wherein a material of the medium layer is zinc.

18. (Original) The process of claim 15, before performing the activation step, further comprising a photolithography step, forming a photo resist layer on the chip, wherein the photo resist layer has at least an opening that exposes the bonding pad, and after forming the bump body, further comprising removing the photo resist layer from the chip.

19. (Original) The process of claim 15, after forming the bump body, further comprising forming a bump body passivation layer on the bump body covering the bump body except for a portion of the bump body that connects to the medium layer.

Customer No.: 31561
Application No.: 10/065,632
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20. (Original) The process of claim 19, wherein a material of the bump body passivation layer is gold.

REMARKS

Present Status of Patent Application

Claims 15-20 remain pending, of which claim 15 has been amended to more clearly describe the claimed invention. Further, the specification has also been amended to correct some minor typographical errors. It is believed that no new matter adds by way of these amendments made to the claims or specification, or otherwise to the application. For at least for the following reasons, Applicant respectfully submits that claims 15-20 patentably define over the prior art of record. Reconsideration is respectfully requested.

Discussion on Claim Rejections:

Response to Claims Rejections under 35 USC§ 102

The Office Action rejected claims 15-17 under 35 U.S.C. 102(b), as being anticipated by Kwon et al. (US-2002/0017711, hereinafter Kwon).

Applicants respectfully disagree and traverse the above rejections as set forth below. Independent claim 15, as amended, is allowable for at least the reason that **Kwon** failed to teach, suggest or disclose every features of the claimed invention. More specifically, Kwon failed to teach, suggest or disclose a process for fabricating a bump comprising at least **“performing an electroless plating process for forming at least a bump body on the medium layer, as required by the amended claim 15”**. The advantage of using an electroless plating process for forming the bump body is that the shape and the height of the bump body can be precisely controlled by controlling the shape, width and the height of the opening in the photoresist layer. Further, by using the electroless plating process for forming the bump body, the process can be substantially simplified compared to the bumping process, and therefore the manufacturing cost can be substantially reduced.

To the contrary, **Kwon** (please see paragraph [0023]) substantially discloses a process of forming a Under Bump Metal (UBM) 108 using electroplating or electroless plating process but failed to teach a method of forming a metal bump 110 using an electroless plating process. Accordingly, Applicants respectfully submit that **Kwon** cannot meet claim 15 in this regard.

Further, **Kwon** substantially teaches (please refer to paragraphs [0024] through [0027]) a semiconductor wafer 100 on which a metal bump 110 is formed. **Kwon** discloses various processes for forming the metal bumps on the chip pads 104 having UBM 108. **According to a first process**, the wafer 100 is dipped in a molten solder 114 in a container 112 can form a solder bump 110a. When the wafer 100 is dipped in the molten solder 114 and taken up, the molten solder 114 sticks only to the UBM 108 on the chip pad 104, not to the passivation layer 106. The solder on the pads 104 solidifies, forming the metal bump

110a. **According to a second process**, metal jetting of molten solder can also form a solder bump 110b, as shown in FIGS. 10 and 11. An injector 116 of a metal jetting apparatus (not shown) drops the molten solder 118 on the chip pad 104. The molten solder 118 solidifies on the chip pad 104, forming the metal bump 110b. **According to a third process**, a wire-cutting method that forms a metal bump 110c. According to this method, a metal wire 124 is ball-bonded on the chip pad 104 with a wire bonder 120, and a cutting tool 122 cuts the metal wire 124 above the ball-shaped portion of the metal wire 110c, forming the metal bump 110c. In other words, Kwon substantially failed to teach, suggest or disclose an electroless plating process for forming metal bumps as specified by the claim 15 of the claimed invention, instead substantially teaches a dip method (first method), a metal jetting of molten solder method (second method) and a wire cutting method as substantially described above. Accordingly, Applicants respectfully submit that **Kwon** cannot possibly meet the claimed invention in this regard.

For at least the foregoing reasons, Applicant respectfully submits claims 15-17 patently define over **Kwon**, and therefore should be allowed. Reconsideration and withdrawal of these rejections is respectfully requested.

Response to Claims Rejections under 35 USC§ 103

The Office Action rejected claims 18-20 under 35 U.S.C. 103(a), as being unpatentable over Kwon as applied to claims 15-17 above, and in further view of Hwan et al. (US-2002/0180064, hereinafter Hwan).

Applicants respectfully disagree and traverse the above rejections as set forth below. Applicants respectfully submit that claims 18-20 depend from independent claim 15 which is deemed allowable over **Kwon** for reasons substantially discussed above, in that **Kwon** substantially lacks a process of performing an electroless plating process for forming the bump body. Even though the Office Action relied upon **Hwan** to disclose a process of forming a photoresist layer (34) having a window (38), however like **Kwon**, **Hwan** also

substantially failed to teach, suggest or disclose a process of performing an electroless plating process for forming the bump body, instead **Hwan** substantially teaches a conventional process of filling the solder metal into the window (38) of the photoresist layer (34) to form the metal solder bump (40). Accordingly, Applicants respectfully submit that **Hwan** disclosure of a process of forming a photoresist layer still cannot cure the specific deficiencies of **Kwon** in this regard. For at least the foregoing reasons, Applicants respectfully submit that no combination of **Kwon** and **Hwan** in a manner suggested by the Office Action can render the claimed invention obvious. Therefore, Applicants respectfully submit that claims 18-20 also patently define over **Kwon** and **Hwan** for the same reasons as substantially discussed above as well. Reconsideration and withdrawal of these rejections is respectfully requested.

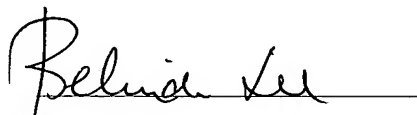
CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 15-20 are in proper condition for allowance. If the Examiner believes that a conference would be of value in expediting the prosecution of this application, he is cordially invited to telephone the undersigned counsel to arrange for such a conference.

Respectfully submitted

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Belinda Lee

Registration No.: 46,863

Jianq Chyun Intellectual Property Office
7th Floor-1, No. 100
Roosevelt Road, Section 2
Taipei, 100
Taiwan
Tel: 011-886-2-2369-2800
Fax: 011-886-2-2369-7233
Email: belinda@jciigroup.com.tw
Usa@jciigroup.com.tw